

All video games are not created equally. Some games immerse players in elaborate, three-dimensional (3-D) environments that simulate laboratories, battles, cities, and planes, challenging players to think logically and make strategic decisions, based on multiple inputs, as they progress through different levels of gameplay. Other relatively simple (frame) games assess learners' abilities to recall facts or complete simple math computations by presenting players with conventional multiple-choice, true-false, fill-in-the-blank, and matching type questions in a format like a game show such as *Jeopardy!* or *Deal or No Deal*. Some may be viewed as action-adventure games, while others may be classified as first-person shooter games, role-playing games (RPG), or massive, multiplayer, online role-playing games (MMORPG). With such diversity, how do teachers select games and integrate gameplay with coursework, applying what we know about teaching and learning, to enhance student achievement and motivation?

In this chapter, I present a “grounded” approach for integrating digital video games with classroom instruction to facilitate learning in educational settings. The approach is grounded in that key pedagogical decisions (e.g., what to do before and after gameplay) are based on research and theories on human learning and instructional design. The chapter is divided into two major parts. In the first part, I relate the structure and function of games to the structure and function of classroom instruction to illustrate different ways games may be applied within a lesson or a course. In the second part, I posit five steps for selecting and integrating games, applying both teacher-directed and student-centered instructional strategies to facilitate game-based learning in educational settings. Examples are provided throughout the chapter to illustrate further the application of the grounded approach.

## Relating Structure and Function

To effectively facilitate game-based learning in K–12 classes, it's important to see how games may be played and integrated at different levels of instruction and to relate these levels to how educators organize courses in terms of structure and function. Typically, training and educational programs are composed of courses that are divided into instructional units or modules. Depending on scope, an instructional unit may be equivalent to a “lesson” or may be further broken down into two or more lessons. Lessons, in turn, may be viewed as a series of instructional events. Figure 10.1 illustrates how a course may be divided into instructional units, and how instructional units may be divided into lessons, and how lessons may be viewed as a series of instructional events. Of course, the specific number of events, lessons, and units contained in a course will vary by course. As depicted in Figure 10.1, a course may consist of two to X number of units. A unit may consist of one lesson or may be broken down into two or more lessons, and each lesson may consist of a varying number of instructional events depending on the strategy that is used to guide the design and sequencing of events.

To integrate gameplay into courses, let's consider how a new game may be designed or an existing game may be applied at various levels:

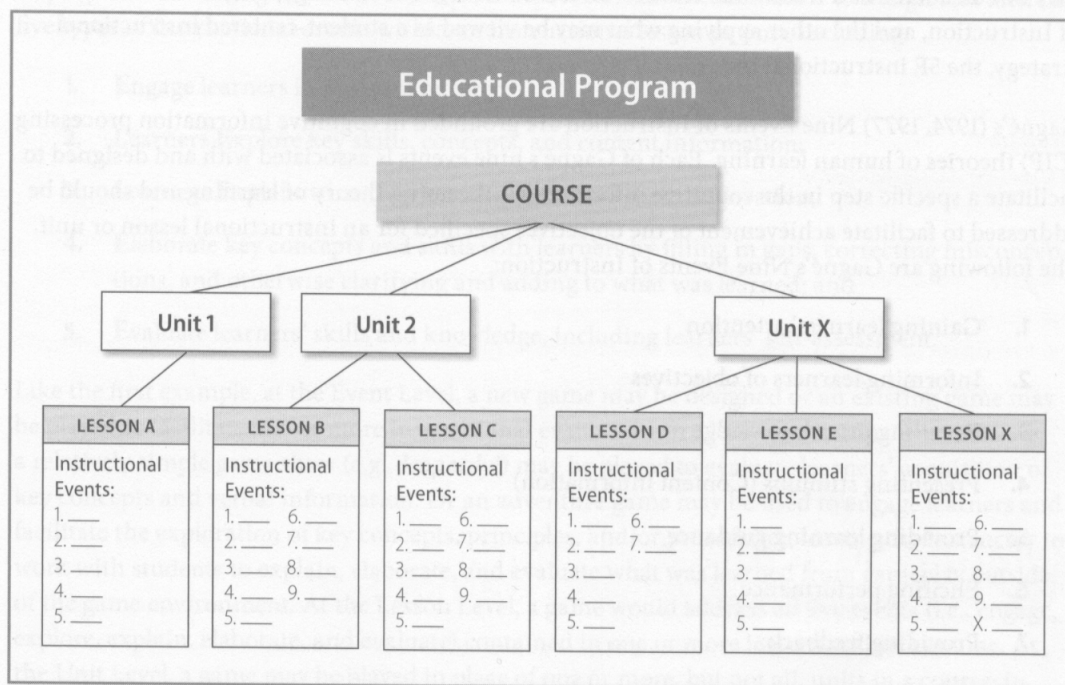
**Level I (Event Level).** Game played to address one or more instructional events within a lesson or across lessons;

**Level II (Lesson Level).** Game played to complete one or more instructional lessons;

**Level III (Unit/Module Level).** Game played to complete one or more instructional units, across lessons within the unit/module;

**Level IV (Course Level).** Game played as an entire course, including all lessons and units; and

**Level V (Program Level).** Game played as an instructional program of study made up of two or more courses.



**FIGURE 10.1** ► Educational course divided into events, lessons, and units

At the Event Level (Level I), a new educational video game may be designed or an existing video game may be integrated to facilitate one or more instructional events within an instructional lesson or across lessons. For example, a relatively simple drill and practice or frame-game may be designed or an existing game may be played to help students recall factual content or to promote their active involvement and discussion (Dempsey, Lucassen, Haynes, & Casey, 1996; Blake and Goodman, 1999). A similar game may also be played at Level I to address the same events across lessons. At the Lesson Level (Level II), a game may be played in place of an instructional lesson or multiple lessons, addressing all of the key events and activities associated with the lesson or lessons. At the Unit Level (Level III), a game may be played to complete one or more, but not all, instructional units contained in a course, addressing all of the events and activities including in the unit or units. At the Course Level (Level IV), one game may be played as an entire course of instruction, incorporating all units, lessons, and events associated with the course. It is also conceivable that a game may be designed or an existing game may be played at a Program Level



(Level V) where completion of the game would satisfy the requirements specified for two or more courses associated with a certificate, degree, or training program. However, the likelihood of such a large-scale game being developed or played at Level V seems remote, at least at this time.

To further illustrate the five levels of gameplay, let's consider the relationship between course structure and grounded instructional strategies. A grounded instructional strategy consists of a set of instructional events that are designed and sequenced based on learning or instructional theories and research. In other words, the strategy is grounded in research and theory. To see how video games may be integrated with instruction, let's look at two examples: one applying what may be considered as a traditional teacher-directed instructional strategy, Gagné's Nine Events of Instruction, and the other applying what may be viewed as a student-centered instructional strategy, the 5E instructional model.

Gagné's (1974, 1977) Nine Events of Instruction are grounded in cognitive information processing (CIP) theories of human learning. Each of Gagné's nine events is associated with and designed to facilitate a specific step in the cognitive information processing theory of learning and should be addressed to facilitate achievement of the objectives specified for an instructional lesson or unit. The following are Gagné's Nine Events of Instruction:

1. Gaining learners' attention
2. Informing learners of objectives
3. Recalling prior knowledge
4. Presenting stimulus (Content information)
5. Providing learning guidance
6. Eliciting performance
7. Providing feedback
8. Assessing performance
9. Enhancing retention and transfer

Gagné's instructional strategy is considered "teacher-directed" because the instructor takes primary responsibility for specifying objectives; selecting, organizing, and delivering the content information; defining student assessment methods and criteria; and otherwise directing the learning process to ensure that students retain the content learned as they transfer and apply it toward accomplishing meaningful work or research.

The relationship between course structure (i.e., event, lesson, unit, course, program) and instructional function, based on application of a grounded instructional strategy, is important for understanding the design and integration of games. Applying Gagné's nine events, for example, we can see that a game may be played at Level I to present stimulus, elicit performance, and/or assess performance (in other words, a subset of events within an instructional lesson or lessons). At Level II, gameplay would address all nine of Gagné's events to facilitate achievement

*Cognitive  
Theory*

of objectives specified for a lesson or lessons. At Level III, a game would be played to complete an entire unit or several units within a course that may, in turn, consist of multiple lessons. At level IV, a game would be played to fulfill the requirements associated with an entire course, addressing all of the instructional events specified for the units and lessons contained in the course. At Level V, the game would transcend multiple courses and either be played as a part of or form an entire program of study.

Now, consider another example of how a grounded approach can be used to design and integrate video games into instruction. Let's say you decide to apply the 5E instructional model to promote inquiry-based learning (BSCS, 2005). The 5E model calls for the instructor to design and facilitate five types of instructional events within an instructional lesson or unit, including:

1. Engage learners in problem or topic;
2. Learners Explore key skills, concepts, and content information;
3. Learners Explain what they have learned from their exploration;
4. Elaborate key concepts and skills with learners by filling in gaps, correcting misconceptions, and otherwise clarifying and adding to what was learned; and
5. Evaluate learners' skills and knowledge, including learners' self-assessment.

*Learner  
Centered*

Like the first example, at the Event Level, a new game may be designed or an existing game may be played to facilitate one or more instructional events within a lesson or lessons. For instance, a relatively simple game show (e.g., *Jeopardy!*) may be played to evaluate learners' acquisition of key concepts and verbal information. Or an adventure game may be used to engage learners and facilitate the exploration of key concepts, principles, and/or procedures, leaving the instructor to work with students to explain, elaborate, and evaluate what was learned from gameplay outside of the game environment. At the Lesson Level, a game would address all five events (i.e., engage, explore, explain, elaborate, and evaluate) contained in one or more lessons within a course. At the Unit Level, a game may be played in place of one or more, but not all, units in a course; in other words, the game would address all five events related to the 5E model multiple times. At the Course Level, a game would be played to address all of the events, lessons, and units contained in a course. And at Program Level IV, a game may cover all courses associated with a certificate, degree, or training program.

The two examples of instructional strategies illustrate how the grounded approach may be applied within the structure of a traditional, teacher-directed approach to teaching and learning, as well as within a relatively modern, learner-centered approach. In the first example, based on the application of Gagné's Nine Events of Instruction, the teacher informs students of learning objectives, organizes and presents content information, and directs the instructional process. (Note that some games are designed to tell students what they will be learning as they play the game.) In the second example of a learner-centered approach, based on the 5E instructional model, the teacher (and sometimes the game itself) may introduce one or more learning events, and then the students take more responsibility for and have more control over the learning process.



The two examples also depict the varying roles the teacher may take during instruction to guide and monitor game-based learning. In the first example, applying Gagné's Nine Events of Instruction, the teacher may do something at the beginning of a class to gain learners' attention, informing them of objectives and helping them to recall prior knowledge. The teacher may then ask learners to play a game that presents content information, provides learning guidance, elicits performance, and provides feedback. After gameplay, the teacher may step in to assess learners' performance and enhance retention and transfer. In the second example, applying the 5E instructional model, the teacher may use a game to engage students' interest and to encourage them to explore key skills, concepts, and questions and to design a research inquiry. After gameplay, the teacher may ask learners to explain what they learned from gameplay and then work with students to elaborate on explanations of how this knowledge can be applied to real-world situations. The instructor may then use different tools and techniques to evaluate student achievement, possibly asking students to assess how well the game delivered its objectives.

In the first part of this chapter, I related the structure and function of courses to the structure and function of games to distinguish five levels of gameplay, noting how (a) courses may be broken down into instructional units, lessons, and events; (b) grounded instructional strategies consist of a set of instructional events; (c) grounded strategies may be applied to a course; and (d) games may be played as a course, unit, lesson, and/or event. Two examples of how games may be applied at varying levels were presented, based on a traditional, teacher-directed strategy and on a more modern, learner-centered strategy for teaching and learning. In the second part of the chapter, I detail five steps for integrating games to facilitate learning in classroom settings based on grounded instructional strategies.

## Five Steps for Integrating Gameplay

For teachers who are just beginning to use video games to enhance learning, the process for integrating gameplay into the curriculum may be easier to understand and apply by initially breaking it down into five relatively simple steps. As teachers increase their knowledge of games and gain experience playing and integrating games for educational purposes, these steps can be transformed into a set of guidelines that may be applied concurrently or in different combinations and sequences, depending on the context.

*Grounded  
in learning  
theory*

**Step 1.** Select a grounded instructional strategy, based on specified objectives, learners' characteristics, classroom context, and epistemological beliefs.

**Step 2.** Play games and determine their suitability and instructional purpose.  
(Is gameplay appropriate? What instructional events are addressed by the game?)

**Step 3.** Operationalize instructional strategy by describing how each event will be applied and noting when a game should be played.